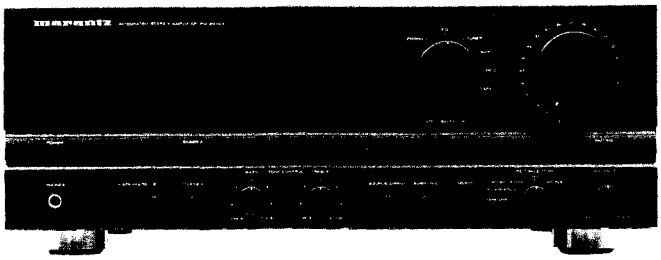
Service Manual

74 PM80/ 20B/21B/22B /21G/22G

Integrated stereo amplifier



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marantz®

model PM-80mkII

First issue: 1993
4822 725 51019
PCS 68 480

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ company has created the ultimate in stereo sound. Only **original MARANTZ parts** can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

Parts for your MARANTZ equipment are generally available at our National Marantz Subsidiary or Agent.

MARANTZ EUROPE B.V.
P.O. Box 80002
Building SFF 2
5600 JB Eindhoven
The Netherlands
Phone : +31-40-732241
Fax : +31-40-735578

ORDERING PARTS

Parts can be ordered either by mail or by telex. In both cases, the correct part number has to be specified. The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which the part is required
5. Way of shipment
6. Signature: any order form or telex must be signed, otherwise such part order will be considered as null and void.

ADDRESSES

AUSTRALIA
MARANTZ AUSTRALIA
Figtree Drive
Australia Centre
Homebush, NSW 2140
AUSTRALIA

AUSTRIA
MARANTZ
Hietzinger Kai 137a
1130 Wien
Austria

BELGIUM
MARANTZ EUROPE B.V.
Div. Benelux
P.O.Box 80002
Building SFF 2
5600 JB Eindhoven
The Netherlands

CHILE
MARANTZ DIVISION OF
PHILIPS S.A.
Av.Santa Maria 0760
Casilla 2687
Santiago
Chile

DENMARK
MARANTZ
Horsvinget 5
2630 Tastrup
Denmark

FINLAND
MARANTZ
Kuortanegatan 1
00520
Helsingfors 52
Finland

FRANCE
MARANTZ FRANCE
4 Rue Bernard Palissy
92600 Asnières
France

GERMANY
MARANTZ GERMANY GmbH
Kleine Heide 12
Postfach 4802
Halle-Westfalen
Germany

GREAT BRITAIN
MARANTZ HiFi UK Ltd.
Kingsbridge House
Padbury Oaks
575-583 Bath Road
Longford Middlesex UB7 OEH,
U.K.

GREECE
ADAMCO ELECTR. SA
P.O.Box 21025
Hippocratus Str. 188
Athens 11471
Greece

ITALY
MARANTZ ITALIANA SPA
Piazza IV Novembre 3
20124 Milano
Italy

JAPAN
MARANTZ JAPAN INC.
35-1, 7-chome, Sagamiono
Sagamihara-shi, Kanagawa
Japan

KUWAIT
AL ALAMIAH ELECTRONICS
P.O.Box 8196
Salmiah
22052 Kuwait

NETHERLANDS
MARANTZ EUROPE B.V.
Div. Benelux
P.O.Box 80002
Building SFF 2
5600 JB Eindhoven
The Netherlands

NORWAY
MARANTZ
Postboks 7034
Assiden
3007 Drammen
Norway

PORTUGAL
COREL
Av. da Liberdade
211-2 Esq.
1200 Lisboa
Portugal

SAUDI ARABIA
AL ALAMIAH ELECTRONICS
P.O.Box 5954
University Street
Riyadh 11432
Saudi Arabia

SOUTH AFRICA
MARANTZ S.A.
10 Bond Street
Randburg 2194
P.O. Box 7703
Johannesburg 2000
South Africa

SPAIN
MARANTZ SPAIN
Martinez Villergas 2
Apartado 2065
Madrid 28027
Spain

SWEDEN
MARANTZ
Box 1324
17125 Solna
Sweden

SWITZERLAND
MARANTZ SWITZERLAND
Postfach
8010 Zürich-Müllingen
Switzerland

TRADING
MARANTZ TRADING
P.O.Box 20008
Building SFF 2
5600 JB Eindhoven
The Netherlands

All of the above locations are fully equipped to take care of your total service needs or can advice you. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at above mentioned address.

TECHINICAL SPECIFICATIONS (DIN)

Power output
RMS 8 Ohms (20 Hz—20 kHz) ..... 100 / 25 W (Class A)
DIN 8 Ohms / 4 Ohms ..... 110 / 160 W

IHF dynamic power
8 Ohms / 4 Ohms / 2 Ohms ..... 135 / 220 / 340 W
THD at 8 Ohms RMS rated output 0.006%
Intermodulation distortion 0.006%
Damping factor 120

Magnetic cartridge input
Input sensitivity impedance ..... 2.8 mV / 47 kOhm
Accuracy of frequency response to RIAA ..... 0.3 dB
Signal to noise ratio ..... 89 dB

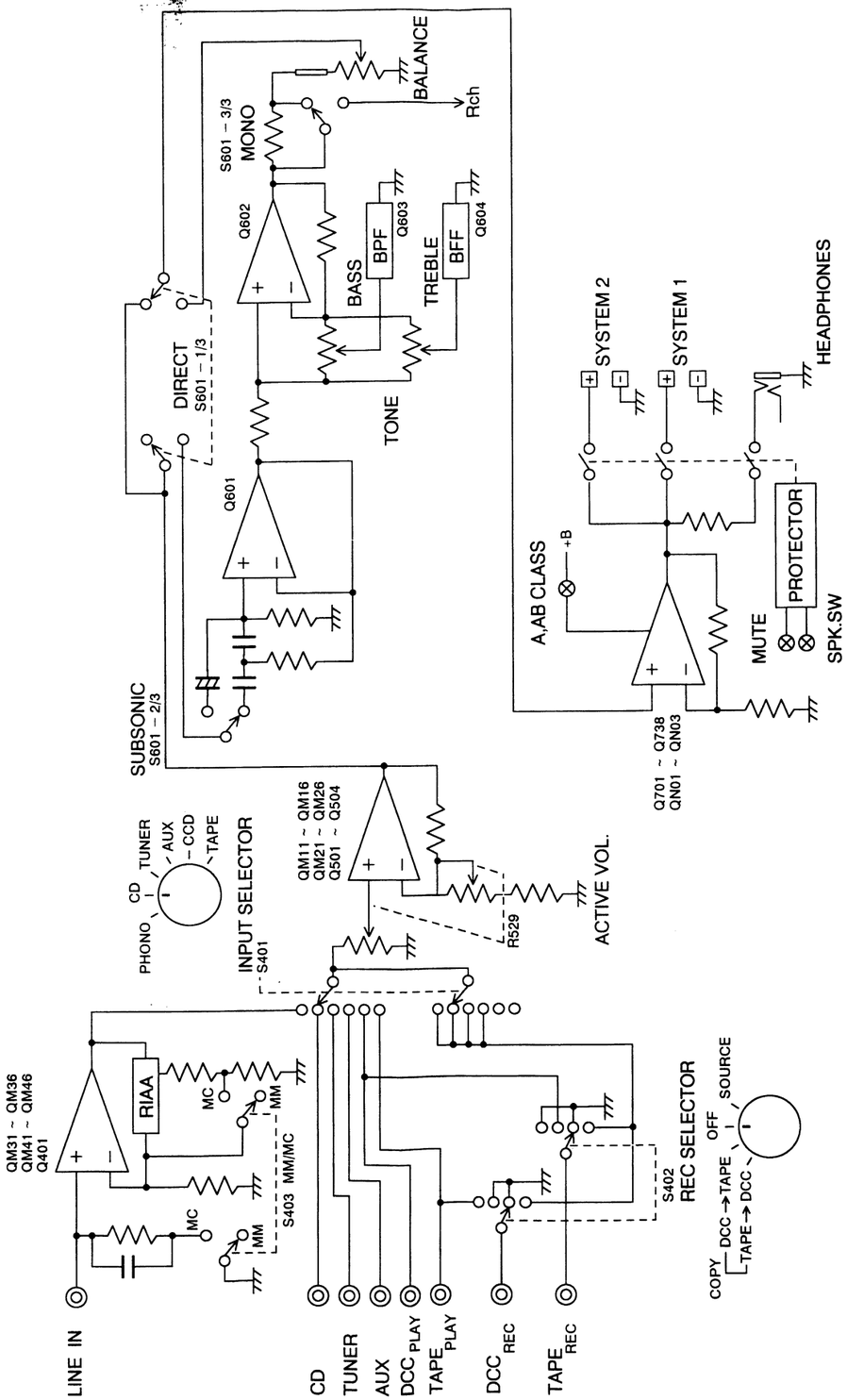
Moving coil cartridge input
Input sensitivity impedance ..... 220 μV / 100 Ohm
Signal to noise ratio ..... 70 dB

Tuner / CD / Aux / Tape inputs
Input sensitivity impedance ..... 170 mV / 20 kOhm
Signal to noise ratio ..... 111 dB
Frequency response (-1 dB limits) ..... 10 Hz—100 kHz
Tone characteristic (100 Hz and 10 kHz) ..... ±7 dB
Channel separation (1 kHz / 10 kHz) ..... > 85 / > 65 dB

General
Power Requirements
/ 20B version ..... 230V AC, 50 / 60 Hz
/ 21B version (4 voltages) ..... 110 / 120 / 220 / 240V AC, 50 / 60 Hz
Dimensions
Panel Width ..... 420 mm
Panel Height ..... 146 mm
Depth ..... 334 mm
Weight
Unit alone ..... 13 kg

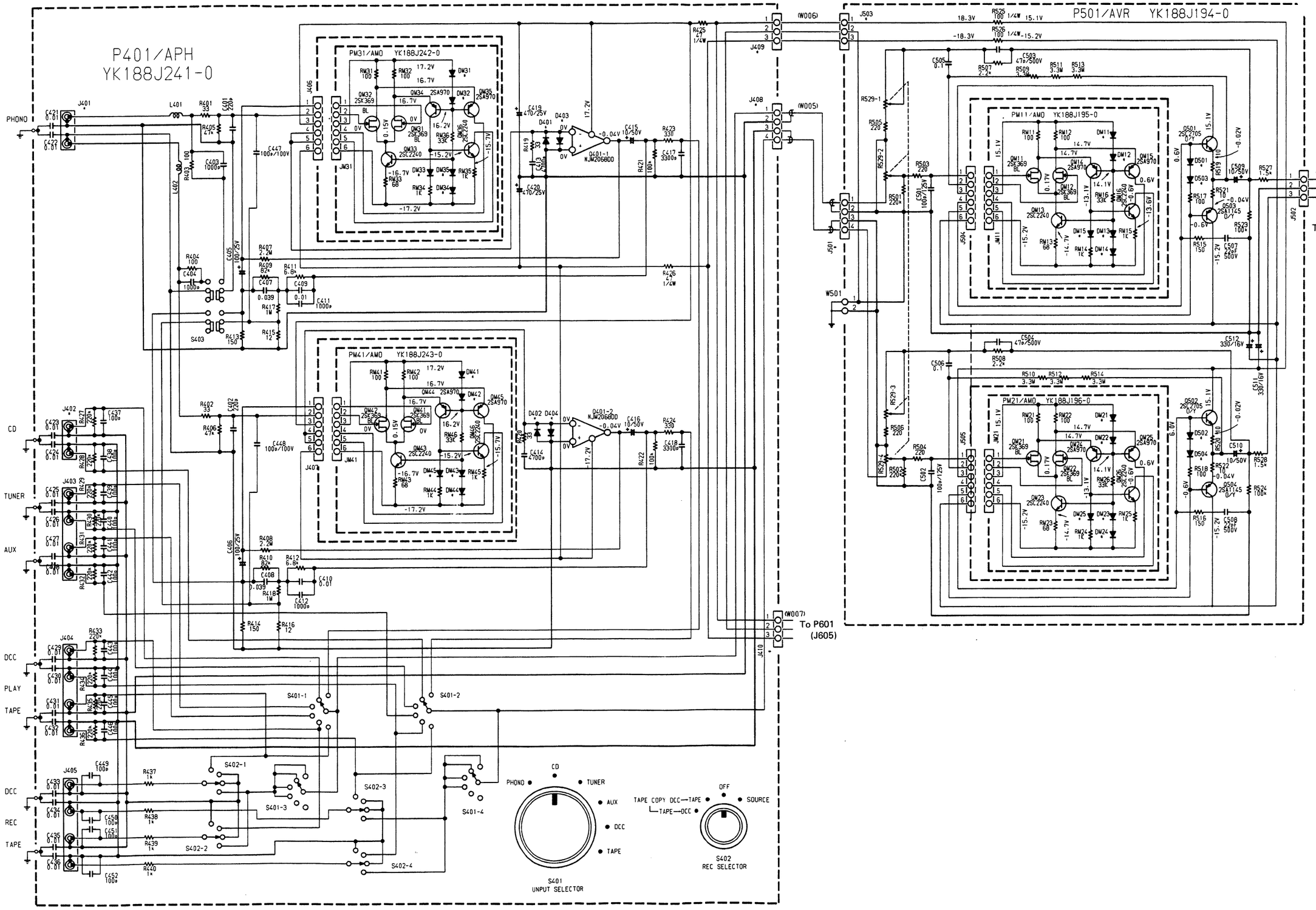
Specifications subject to change without prior notice.

1. BLOCK DIAGRAM



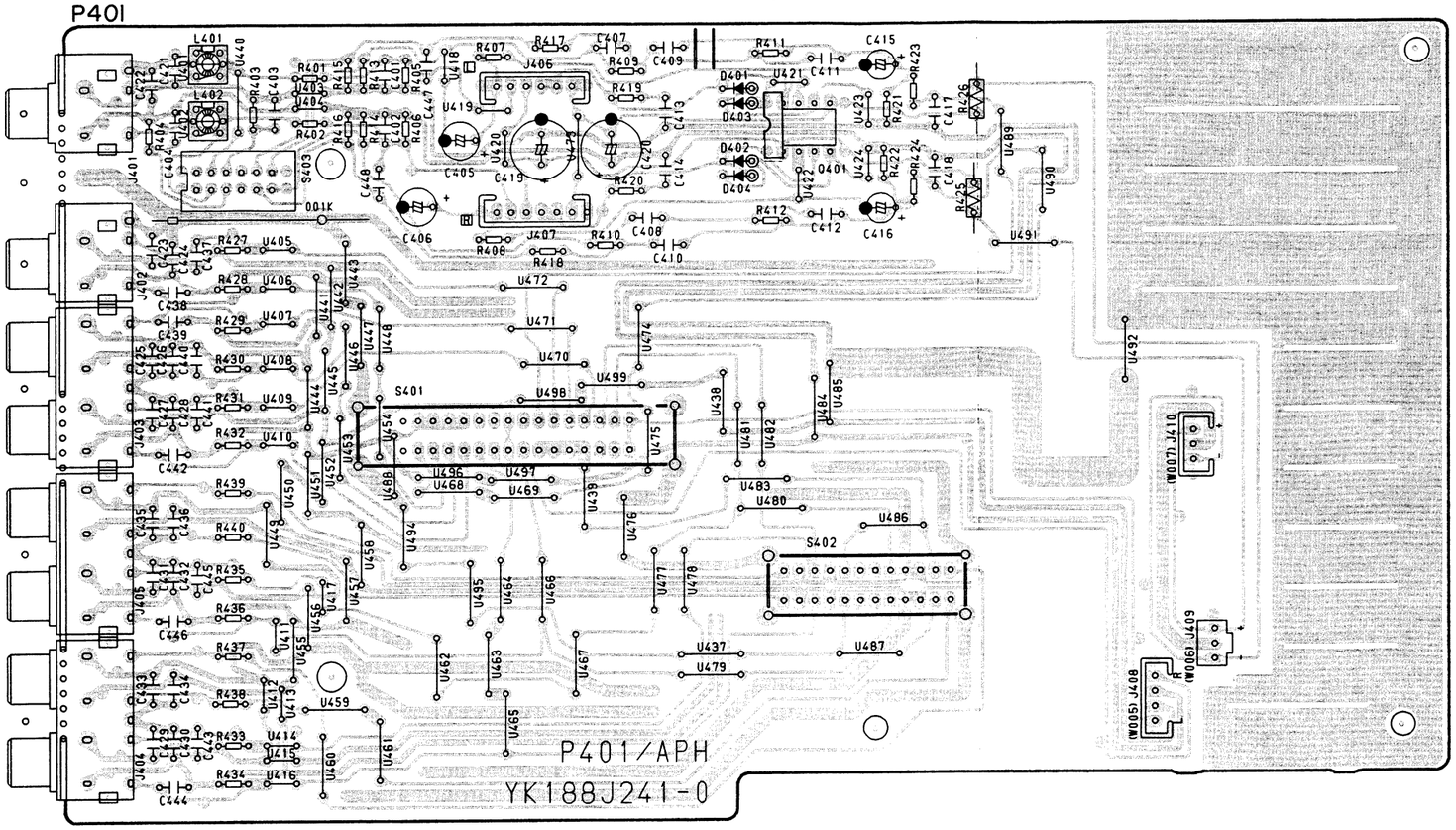
MARA-00633 / DRUCK 1

2. SCHEMATIC DIAGRAM AND PARTS LOCATION (Pattern Side)



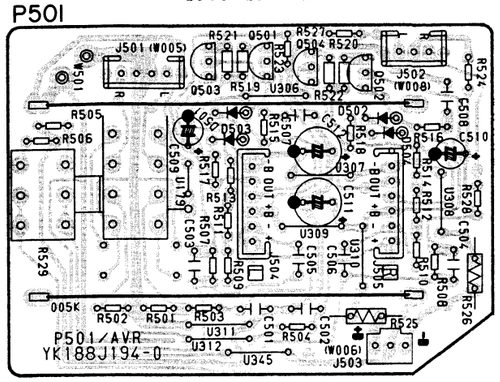
Q401

P401



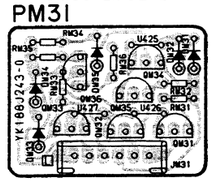
Q503 Q501 Q504 Q502

P501



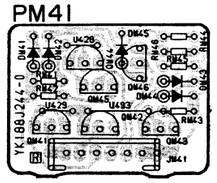
QM36 QM35 QM34
QM33 QM32 QM31

PM31



QM44 QM45 QM46
QM41 QM42 QM43

PM41



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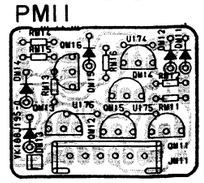
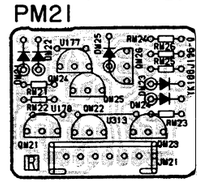
QM13 QM12 QM11

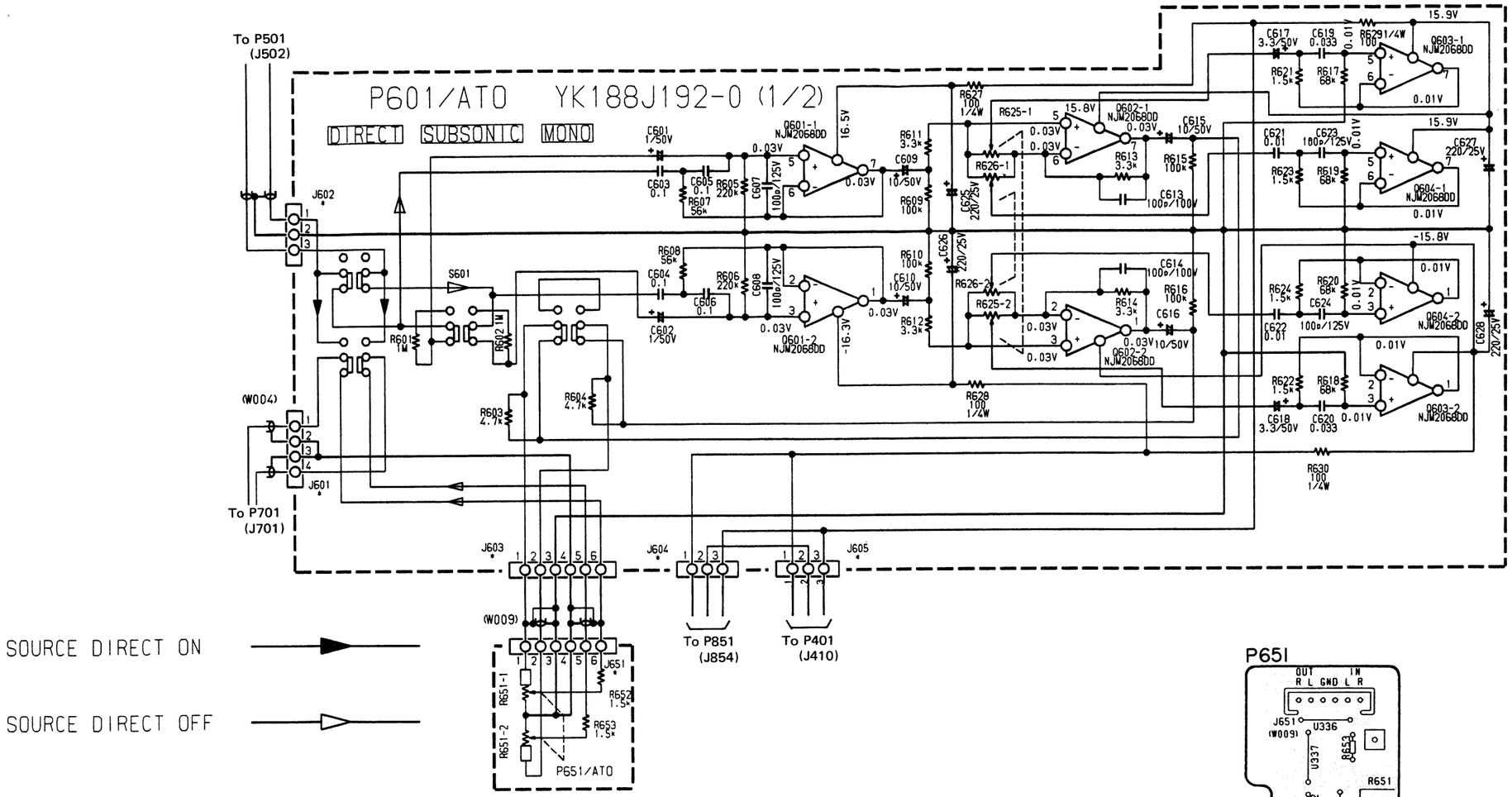
PM11

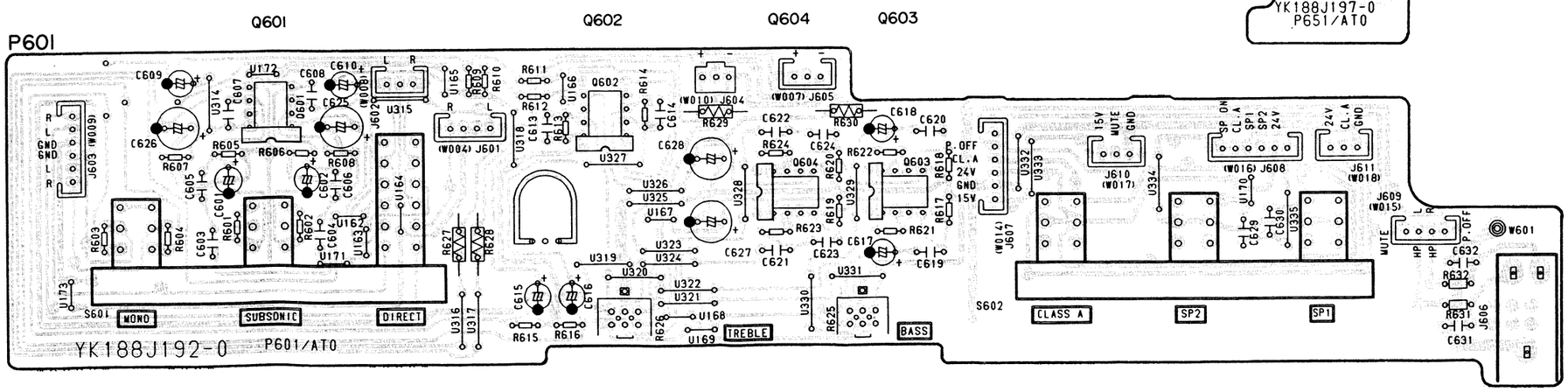


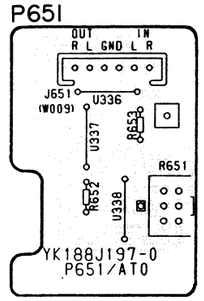
QM24 QM25 QM26
QM21 QM22 QM23

PM21




P601/ATO YK188J192-0 (1/2)
DIRECT
SUBSONIC
MONO
To P501
(J502)
To P701
(J701)
To P851
(J854)
To P401
(J410)
SOURCE DIRECT ON
SOURCE DIRECT OFF
P651/ATO


P601
Q601
Q602
Q604
Q603
MONO
SUBSONIC
DIRECT
TREBLE
BASS
CLASS A
SP2
SP1
YK188J192-0 P601/ATO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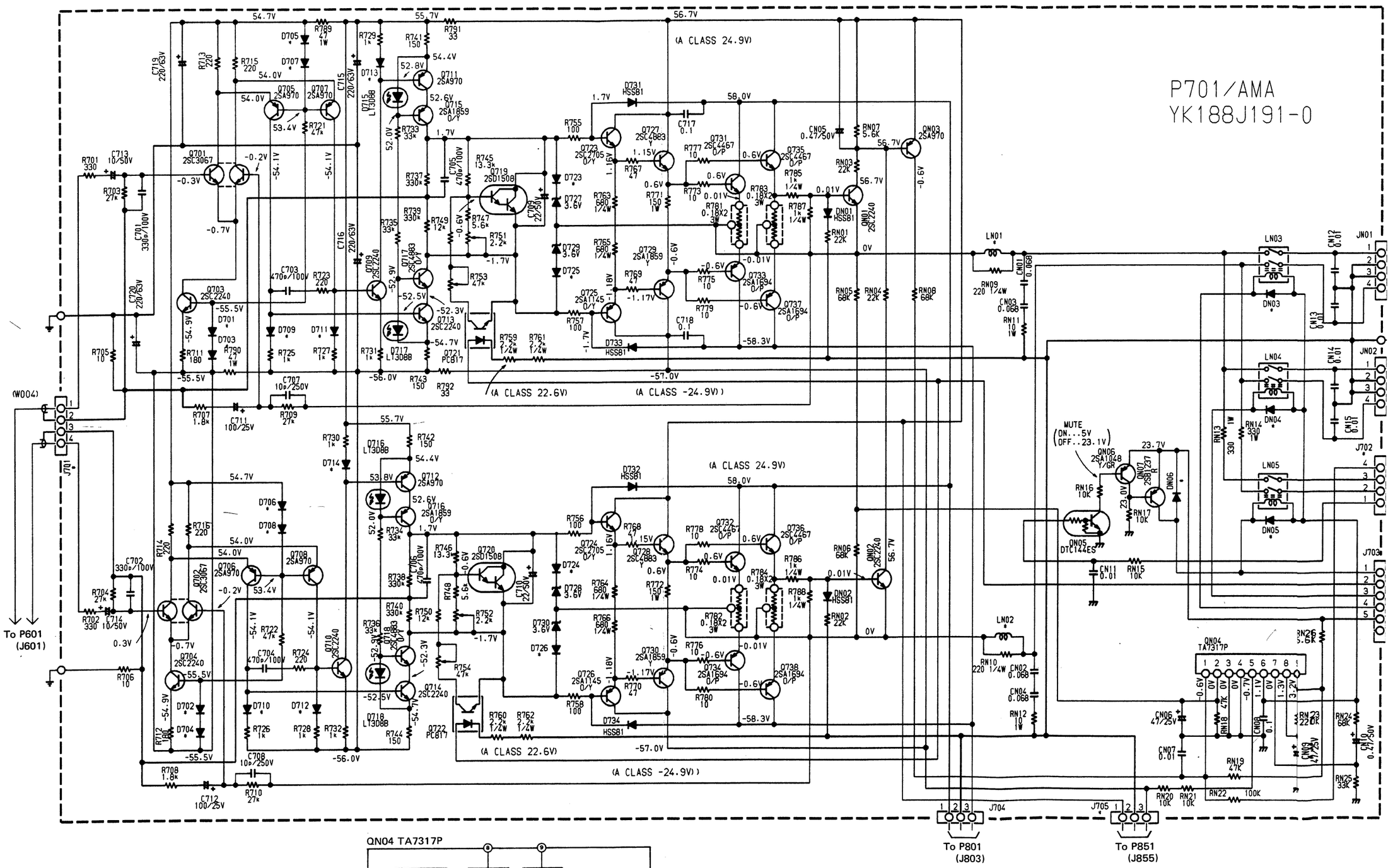
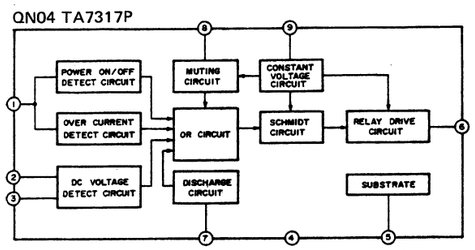
YK188J197-0
P651/ATO

P701/AMA
YK188J191-0



QN04 TA7317P



P701/AMA
YK188J191-0

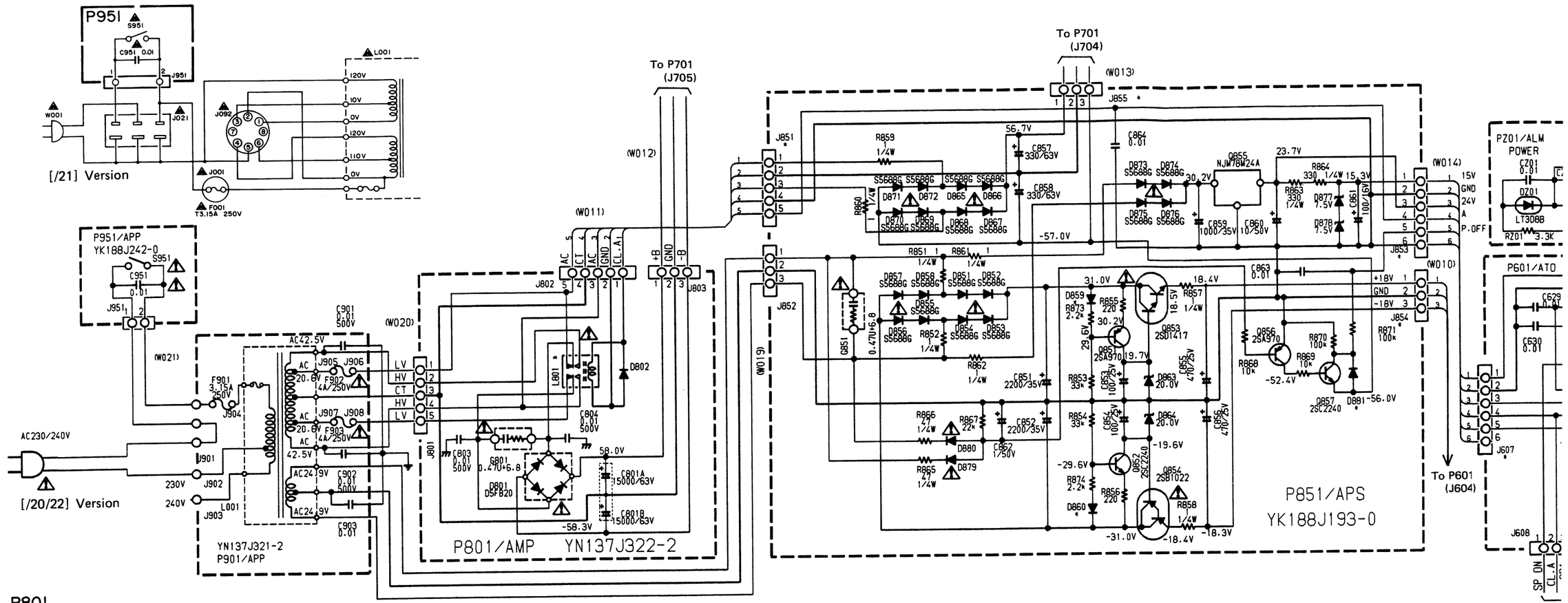
56.7V
(A CLASS 24.9V)
58.0V
1.7V
D731 HSS81
R755 100
Q727 2SC4883 Y
C717 0.1
Q723 2SC2705 O/Y
1.15V
1.16V
Q731 2SC4467 O/P
R777 10
0.6V
Q735 2SC4467 O/P
R785 1k 1/4W
RN03 22K
CN05 0.27/50V
RN07 5.6K
QN03 2SA970
56.7V
-0.6V
D723
D727 3.6V
R763 680 1/4W
R771 150 1W
R773 10
0.01V
R783 0.18X2 3W
R781 0.18X2 3W
R787 1k 1/4W
DN01 HSS81
QN01 2SC2240
RN01 22K
0V
D729 3.6V
R765 680 1/4W
Q729 2SA1859 Y
-0.6V
-0.01V
D725
R769 47
Q725 2SA1145 O/Y
-1.18V
-1.17V
R775 10
Q733 2SA1694 O/P
Q737 2SA1694 O/P
RN05 68K
RN04 22K
RN08 68K
R757 100
-1.7V
C718 0.1
R779 10
R761 1/2W
D733 HSS81
-58.3V
-57.0V
(A CLASS 22.6V)
(A CLASS -24.9V))
LN01
CN01 0.068
RN09 220 1/4W
CN03 0.068
RN11 10 1W
LN03
CN12 0.01
JN01
SPK SYSTEM 2
DN03
LN04
CN14 0.01
JN02
SPK SYSTEM 1
DN04
RN13 330 1W
LN05
J702
P.OFF
PH L
PH R
MUTE
To P601 (J609)
(W015)
DN05
MUTE (ON...5V OFF..23.1V)
QN06 2SA1048 Y/GR
23.7V
QN07 2SB1237 R
23.0V
DN06
RN16 10K
RN17 10K
QN05 DTC124ES
CN11 0.01
RN15 10K
J703
SP ON
A
SP1
SP2
24V
To P601 (J608)
(W016)
D732 HSS81
(A CLASS 24.9V)
58.0V
R756 100
Q724 2SC2705 O/Y
Q728 2SC4883 Y
R768 47
1.15V
1.16V
Q732 2SC4467 O/P
R778 10
0.6V
Q736 2SC4467 O/P
R786 1k 1/4W
RN06 68K
QN02 2SC2240
56.7V
0.01V
D724
D728 3.6V
R764 680 1/4W
R772 150 1W
R774 10
0.01V
R784 0.18X2 3W
R788 1k 1/4W
DN02 HSS81
RN02 22K
0V
D730 3.6V
D726
R766 680 1/4W
Q730 2SA1859 Y
-0.6V
-0.01V
Q726 2SA1145 O/Y
-1.18V
-1.17V
R776 10
Q734 2SA1694 O/P
Q738 2SA1694 O/P
R770 47
R782 0.18X2 3W
R780 10
R758 100
D734 HSS81
-58.3V
-57.0V
(A CLASS 22.6V)
(A CLASS -24.9V))
R762 1/2W
LN02
RN10 220 1/4W
CN02 0.068
CN04 0.068
RN12 10 1W
QN04 TA7317P
1 2 3 4 5 6 7 8 9
-0.6V 0V 0V -0.7V 1.1V 0V 1.3V 3.2V
RN26 5.6K
RN18 47K
RN23 220K
RN24 68K
CN06 47/25V
CN08 0.1
CN09 47/25V
CN10 0.47/50V
CN07 0.01
RN19 47K
RN25 33K
RN20 10K
RN21 10K
RN22 100K
J704
J705
1 2 3
To P801 (J803)
To P851 (J855)

CONSTANT VOLTAGE CIRCUIT
SCHMIDT CIRCUIT
RELAY DRIVE CIRCUIT
SUBSTRATE

P701

Q736
QN02 QN05
QN03 QN06
Q738
Q728 Q722
Q720
Q730
Q726 Q724
Q732 Q714 Q718
Q712 Q716
Q710
Q734 Q706 Q704
Q702
Q708

QN01 Q735
QN04
Q737
Q721 Q727
Q719
Q729
Q723
Q725
Q717 Q713 Q731
Q715 Q711
Q709
Q703 Q705 Q733
Q701
Q707



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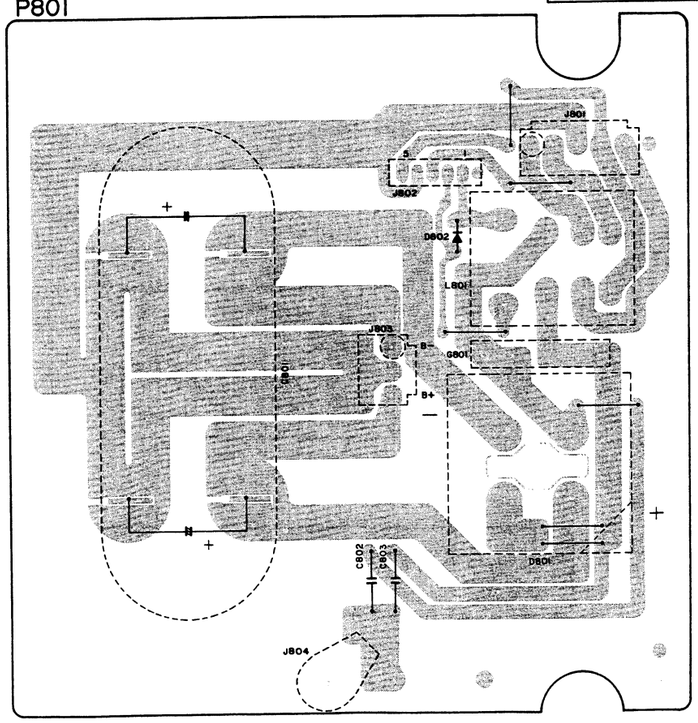

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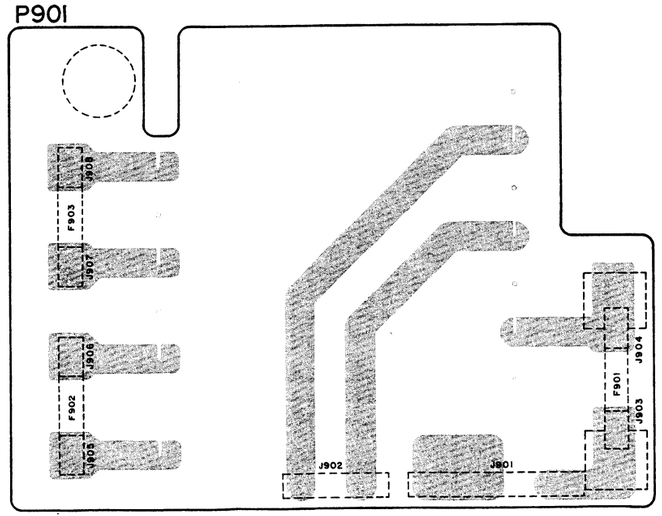
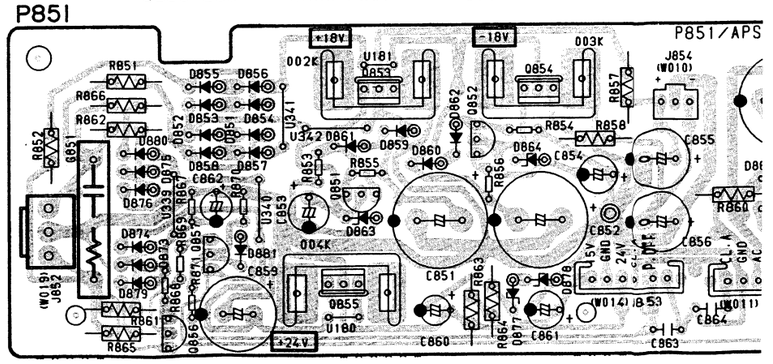


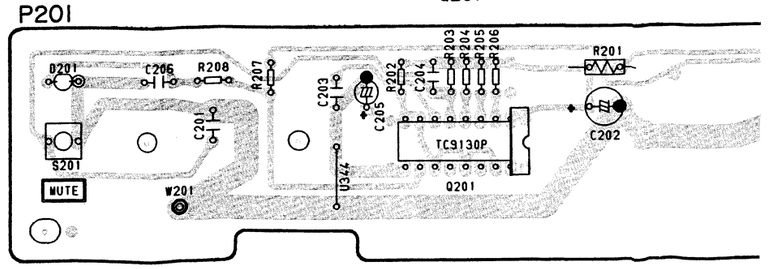
Q853 Q854
Q856 Q857 Q855 Q851 Q852

P851



Q201

P201



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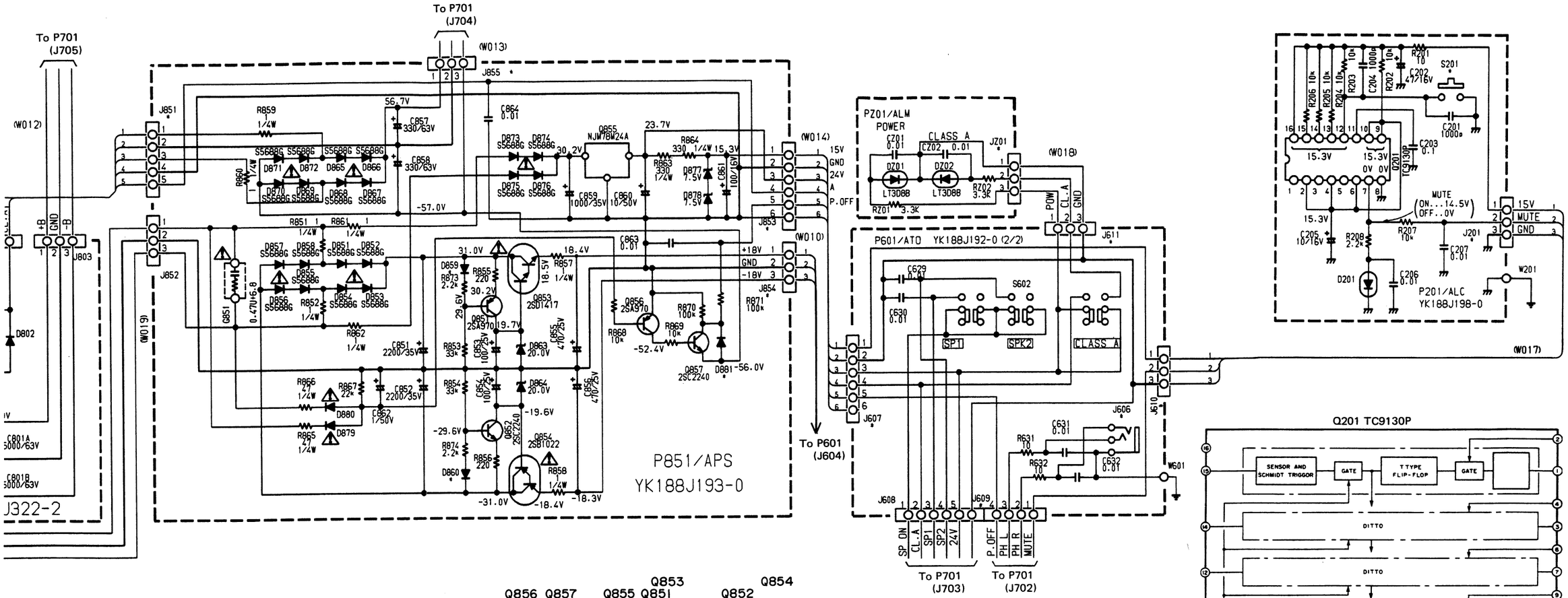
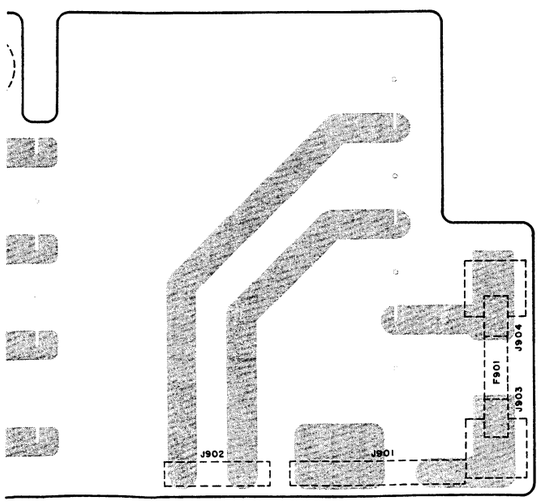
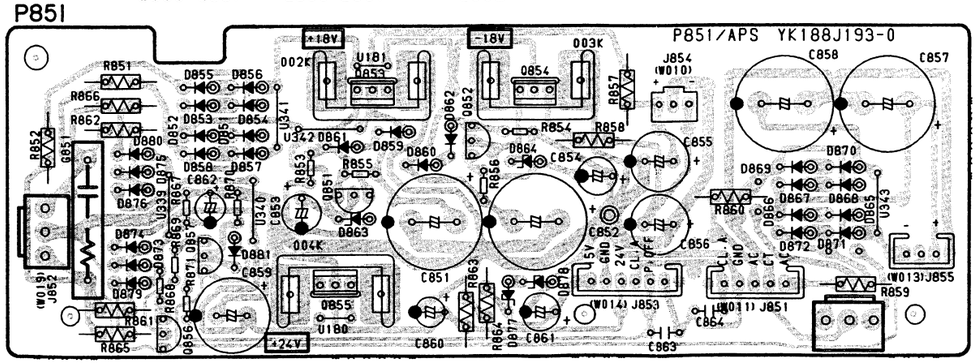
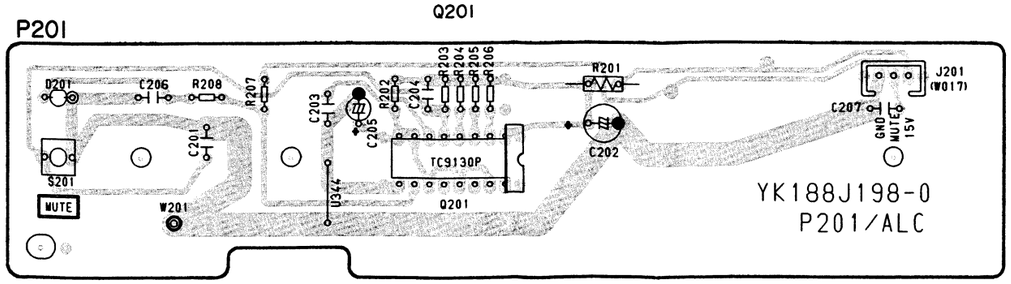
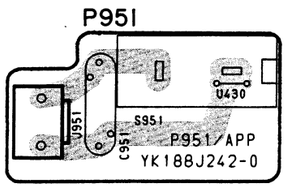


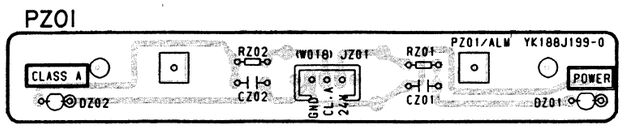


Q856 Q857 Q855 Q851 Q853 Q852 Q854

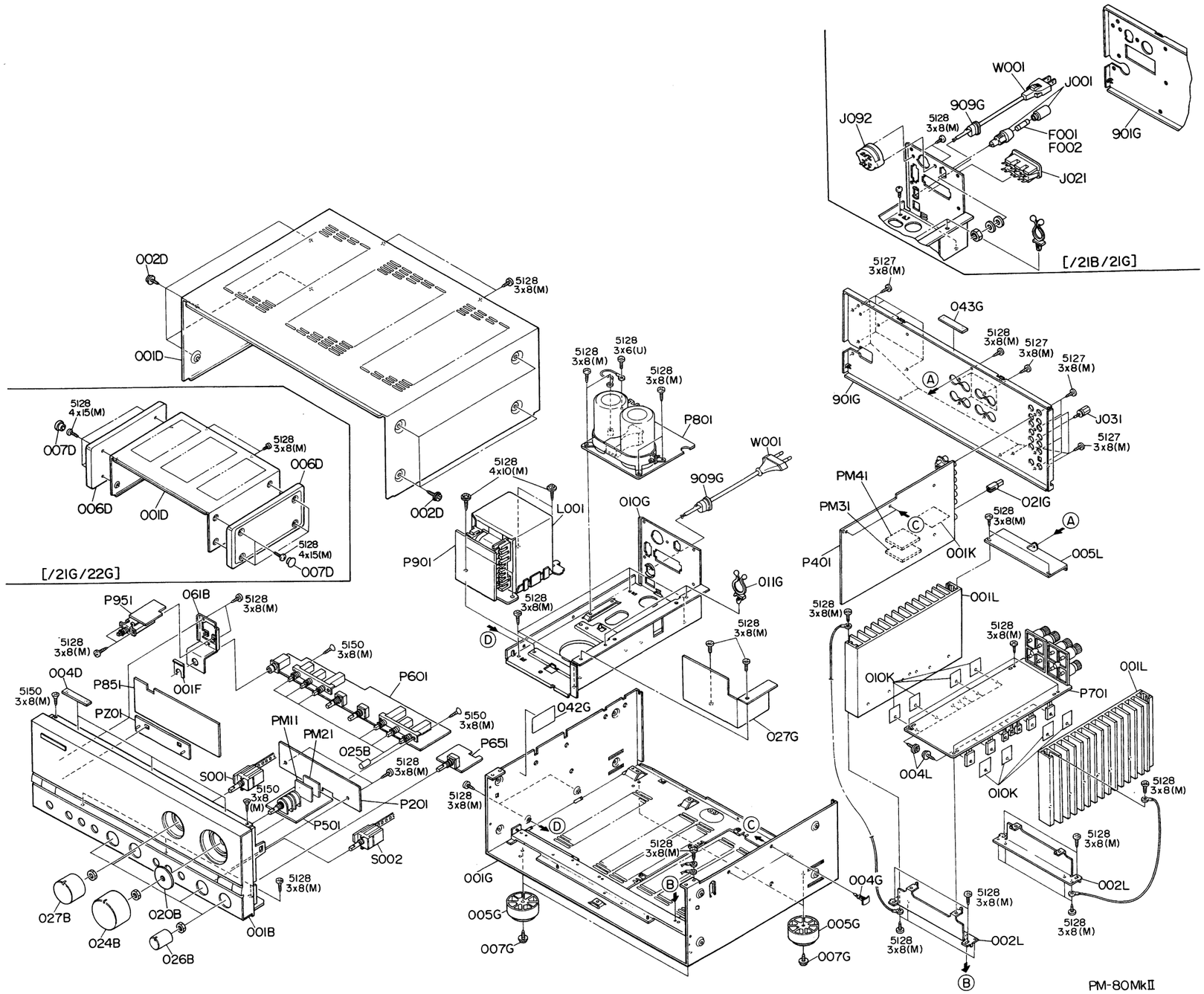








3. EXPLODED VIEW AND PARTS LIST



REF. DESIG.	PART NO.	DESCRIPTION
001B	4822 426 51648	Front Panel Assembly [/20B/21B/22B]
	4822 426 51649	Front Panel Assembly [/21G/22G]
024B	4822 413 41679	Knob, Volume [/20B/21B/22B]
	4822 413 41683	Knob, Volume [/21G/22G]
025B	4822 410 60343	Button, Push [/20B/21B/22B]
	4822 410 60334	Button, Push [/21G/22G]
026B	4822 413 41678	Knob, Rec/ Tone/ Bal. [/20B/21B/22B]
	4822 413 41682	Knob, Rec/ Tone/ Bal. [/21G/22G]
027B	4822 413 41681	Knob, Selector [/20B/21B/22B]
	4822 413 41684	Knob, Selector [/21G/22G]
002D	4822 501 11008	B. T. Screw (W/W) M4 x 8 [/20B/21B/22B]
006D	4822 426 30148	Side Panel [/21G/22G]
007D	4822 444 60607	Cap, Side Panel [/21G/22G]
001F	4822 401 11351	Clamper, Pone Jack
005G	4822 462 41383	Leg
007G	4822 501 11008	B. T. Screw (W/ W) M4 x 8
021G	4822 412 20506	Knob, MM/ MC
909G	4822 532 52145	Bushing, AC Cord [/21B/21G]
	4822 532 60948	Bushing, AC Cord [/20B/22B/22G]
004L	4822 502 13851	B. T. Screw (W/ W) M3 x 15
001T	4822 736 21747	User Manual
▲ F001	4822 070 33152	Fuse 3.15A 250V [/21B/21G]
▲ F002	4822 253 30243	Fuse 6.3A 250V [/21B/21G]
▲ J001	4822 256 30233	Jack, Fuse Holder [/21B/21G]
▲ J021	4822 267 40663	Jack, AC Outlet 3P [/21B/21G]
J031	4822 290 40297	Terminal, GND [/20B/21B/22B]
	4822 267 31544	Terminal, GND [/21G/22G]
▲ J092	4822 272 10227	Voltage Selector [/21B/21G]
▲ J099	4822 265 10092	Jack, AC Adapter [/21B/21G]
▲ L001	4822 146 21734	Power Trasformer [/20B/22B/22G]
	4822 146 21735	Power Trasformer [/21B/21G]
S001	4822 273 10271	Rotary Switch, Input Select
S002	4822 273 10269	Rotary Switch, Rec Select

4. TEST EQUIPMENT REQUIRED FOR SERVICING

Item	Use
Distortion Analyzer	Distortion measurements
Audio Oscillator	Sinewave and squarewave signal source
ACVTVM	Voltage measurements (AC)
Oscilloscope	Waveform analysis and trouble shooting and ASO alignment
Circuit Tester	Trouble shooting
DCVTVM	Voltage measurements (DC)
AC Wattmeter	Monitors primary power to amplifier
Line Voltmeter	Monitors potential of primary power to amplifier
Variable Autotransformer	Adjust level of primery power to amplifier
Shorting Plug	Shorts amplifier input to eliminate noise pickup

5. IDLING CURRENT ADJUSTMENT

1) With the power not supplied, set the MASTER VOLUME control to the minimum position and the BALANCE and TONE controls to the center click positions. Also set semi-fixed resistors R751 and R753 (for L CH), or R752 and R754 (R CH), on the PC board (P701) to the fully counterclockwise positions.
2) Connect a digital voltmeter to the terminals on the extremities of cement resistor R781 or R783 (for L CH), or R782 or R784 (for R CH), on the PC board (P701). Connect it to the terminals of resistor R781 or R783 for the L CH adjustment, or to the terminals of resistor R782 or R784 for the R CH adjustment.
3) After making the setup above, proceed to the Class AB idling current adjustment as described in the following. Turn power ON and after 30 minutes, turn semi- fixed resistor R751 (for L CH) or R752 (for R CH) on the P701 so that the digital voltmeter indicates 18 mV (50 mA).
4) After the completion of the Class AB idling current adjustment, proceed to the Class A idling current adjustment.
   Press the Class A switch, then turn semi-fixed resistor R753 (for L CH) or R754 (for R CH) on the P701 so that the digital voltmeter indicates 180 mV (500 mA) with both L and R CH. Note that this target setting value is the value in 30 minutes after turning power ON.

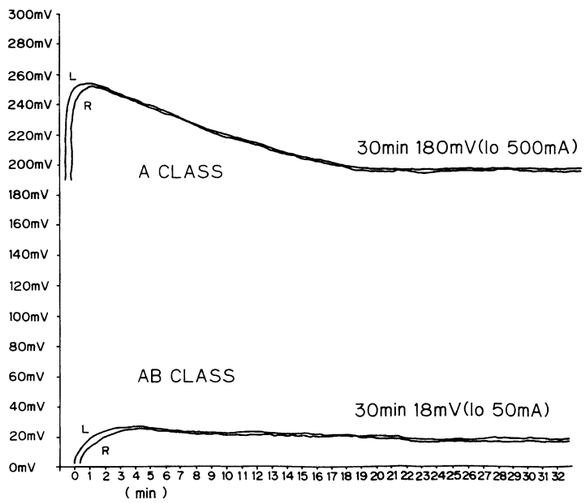
(Note) Always start with the Class AB idling current adjustment first, then proceed to the Class A adjustment after it.
Use the following tables and graphs for your reference.

Class AB Elapsed Time After Power ON	Idling Current Adjustment Value
30 sec. to 1 min.	19 mV to 23 mV
1 min. to 5 min.	23 mV to 27 mV
10 min.	24 mV

Class A Elapsed Time After Power ON	Idling Current Adjustment Value
30 sec. to 1 min.	250 mV to 260 mV
1 min. to 5 min.	230 mV to 260 mV
10 min.	210 mV

5) In case the adjustment is performed after a heat run, aging or servicing, leave the unit for 30 minutes with power ON, no signal and no load, then make the Class AB adjustment to 18 mV and, after it, make the Class A Adjustment to 180 mV.

Idling Current



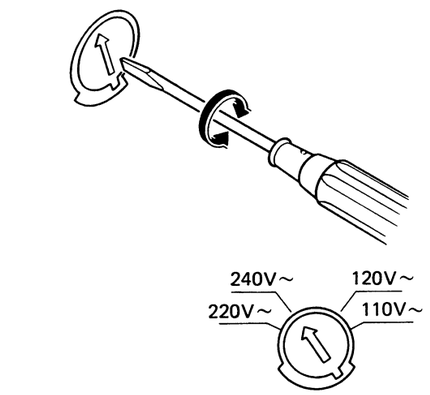
Note on Safety:
Symbol ▲ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ▲. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

6. VOLTAGE CONVERSION

- **[/21] ONLY**

To convert the unit to a different power source voltage, change the position as illustrated in the drawing below.

VOLTAGE SELECTOR

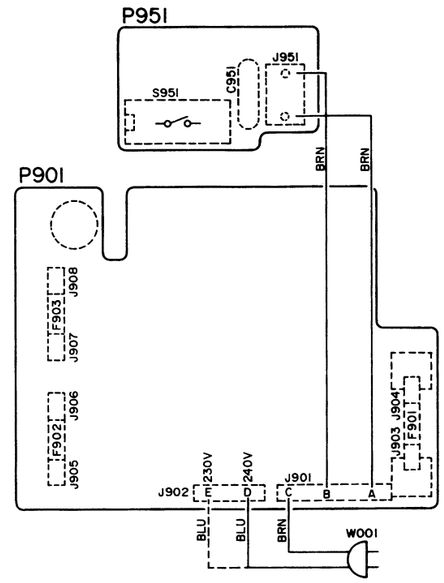


CAUTION
DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.

7. HOW TO CHANGE THE SUPPLY VOLTAGE [/20/22] Versions

The 230V rated supply voltage of the /22 and /20 Versions can be changed to 240V.

Refer to the following diagram for the voltage change procedure.

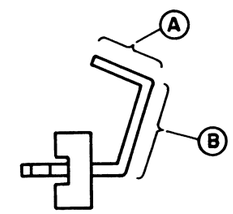


Soldered surface of P901

After binding solder around the terminal, bundle the brown wire and blue wire together and tighten them with a tightener.

- **Note on Terminals J901 and J902**

Wrapping terminals J901 and J902 on the P901 PC board are critical components for the safety. Please observe the following caution when working these terminals.



Terminal side view

Wrapping shall be performed within range A .
When binding up solder, apply solder within range B .

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8. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05xxx140. Carbon film fixed resistor, ±5% 1/4W
R***: (2) GD05xxx160. Carbon film fixed resistor, ±5% 1/6W
① —— Resistance value

Examples ;
① Resistance value

0.1Ω...001	10Ω...100	1kΩ...102	100kΩ...104
0.5Ω...005	18Ω...180	2.7kΩ...272	680kΩ...684
1Ω...010	100Ω...101	10kΩ...103	1MΩ...105
6.8Ω...068	390Ω...391	22kΩ...223	4.7MΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1xxxx370. Ceramic capacitor
Disc type
Temp.coeff.P350~N1000,50V
① Capacity value
② Tolerance

Examples
① Tolerance (Capacity deviation)
±0.25pF ... 0
±0.5pF ... 1
±5% ... 5
* Tolerance of COMMON PARTS handled here are as follows :
0.5pF~ 5pF...±0.25pF
6pF~ 10pF...±0.5pF
12pF~ 560pF...±5%
② Capacity value

0.5pF...005	3pF...030	100pF...101
1pF...010	10pF...100	220pF...221
1.5pF...015	47pF...470	560pF...561

C**: CERAMIC CAP.
(1) DK16xxx300. High dielectric constant ceramic capacitor
① Disc type
Temp.chara. 2B4, 50V
Capacity value

Examples
② Capacity value

100pF...101	1000pF...102	10000pF...103
470pF...471	2200pF...222	

C***: ELECTROLY CAP.(⏚), FILM CAP.(⏤)
(1) EAxxxxxx10. Electrolytic capacitor
One-way lead type, Tolerance ±20%
① Working voltage
② Capacity value

Examples
① Capacity value

0.1μF...104	4.7μF...475	100μF...107
0.33μF...334	10μF...106	330μF...337
1μF...105	22μF...226	1100μF...108
		2200μF...228

② Working voltage

6.3V...006	25V...025
10V...010	35V...035
16V...016	50V...050

(2) DF15xxx350. Plastic film capacitor
One-way type, Mylar ±5% 50V
① Capacity value

Examples
① Capacity value

0.001μF(1000pF)...102	0.1μF...104
0.0018μF.....182	0.56μF...564
0.01μF.....103	1μF...105
0.015μF.....153	

NOTE : The above CODES (R**,R***,C***,C** and C***) are omitted on the schematic diagram in some case.
On the occasion, be confirmed the common parts on the parts list.

REF. DESIG.	PART NO.	DESCRIPTION
		PM11-AMP MODULE L CIRCUIT BOARD
		PM11-RESISTORS
RM11	4822 116 82749	100Ω ±1% 1/6W
RM12	4822 116 82749	100Ω ±1% 1/6W
		PM11-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RM13, RM14, RM15, RM16
		PM11-SEMICONDUCTORS
DM11 ~ DM15	4822 130 33305	Diode 1SS176, etc.
QM11	4822 130 42839	F. E. T. 2SK369 (BL)
QM12	4822 130 42839	F. E. T. 2SK369 (BL)
QM13	4822 130 43233	Transistor 2SC2240 (GR, BL)
QM14	4822 130 42951	Transistor 2SA970 (GR, BL)
QM15	4822 130 42951	Transistor 2SA970 (GR, BL)
QM16	4822 130 43233	Transistor 2SC2240 (GR, BL)
		PM21-AMP MODULE R CIRCUIT BOARD
		PM21-RESISTORS
RM21	4822 116 82749	100Ω ±1% 1/6W
RM22	4822 116 82749	100Ω ±1% 1/6W
		PM21-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RM23, RM24, RM25, RM26
		PM21-SEMICONDUCTORS
DM21 ~ DM25	4822 130 33305	Diode 1SS176, etc.
QM21	4822 130 42839	F. E. T. 2SK369 (BL)
QM22	4822 130 42839	F. E. T. 2SK369 (BL)
QM23	4822 130 43233	Transistor 2SC2240 (GR, BL)
QM24	4822 130 42951	Transistor 2SA970 (GR, BL)
QM25	4822 130 42951	Transistor 2SA970 (GR, BL)
QM26	4822 130 43233	Transistor 2SC2240 (GR, BL)
		PM31-AMP MODULE L CIRCUIT BOARD
		PM31-RESISTORS
RM31	4822 116 82749	100Ω ±1% 1/6W
RM32	4822 116 82749	100Ω ±1% 1/6W
		PM31-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RM33, RM34, RM35, RM36
		PM31-SEMICONDUCTORS
DM31 ~ DM35	4822 130 33305	Diode 1SS176, etc.
QM31	4822 130 42839	F. E. T. 2SK369 (BL)
QM32	4822 130 42839	F. E. T. 2SK369 (BL)
QM33	4822 130 43233	Transistor 2SC2240 (GR, BL)
QM34	4822 130 42951	Transistor 2SA970 (GR, BL)
QM35	4822 130 42951	Transistor 2SA970 (GR, BL)
QM36	4822 130 43233	Transistor 2SC2240 (GR, BL)

REF. DESIG.	PART NO.	DESCRIPTION
		PM41-RESISTORS
RM41	4822 116 82749	100 Ω ±1% 1/6W
RM42	4822 116 82749	100 Ω ±1% 1/6W
		PM41-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RM43, RM44, RM45, RM46
		PM41-SEMICONDUCTORS
DM41 ~ DM45	4822 130 33305	Diode 1SS176, etc.
QM41	4822 130 42839	F. E. T. 2SK369 (BL)
QM42	4822 130 42839	F. E. T. 2SK369 (BL)
QM43	4822 130 43233	Transistor 2SC2240 (GR, BL)
QM44	4822 130 42951	Transistor 2SA970 (GR, BL)
QM45	4822 130 42951	Transistor 2SA970 (GR, BL)
QM46	4822 130 43233	Transistor 2SC2240 (GR, BL)
		PZ01-POWER/ CLASS A IND. CIRCUIT BOARD
		PZ01-CAPACITORS
CZ01	4822 122 32486	Ceramic 0.01μF +80% -20%
CZ02	4822 122 32486	Ceramic 0.01μF +80% -20%
		PZ01-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RZ01, RZ02
		PZ01-SEMICONDUCTORS
DZ01	4822 130 80326	L. E. D. LT3D8B (RED)
DZ02	4822 130 80326	L. E. D. LT3D8B (RED)
		P201-MUTE SWITCH CIRCUIT BOARD
		P201-CAPACITORS
C202	4822 124 41246	Elect 47μF 16V
C203	4822 122 40617	Ceramic 0.1μF +80% -20%
C205	4822 124 21894	Elect 10μF 16V
C206	4822 122 32486	Ceramic 0.01μF +80% -20%
C207	4822 122 32486	Ceramic 0.01μF +80% -20%
		P201-CAPACITORS (COMMON)
C***		High Dielectric Constant Ceramic Capacitor: C201, C204
		P201-RESISTOR
R201	4822 052 10109	10 Ω ±5% 1/4W
		P201-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R202~R208
		P201-SEMICONDUCTORS
D201	4822 130 80326	L. E. D. LT3D8B (RED)
Q201	4822 209 70069	IC TC9130P
		P201-MISCELLANEOUS
S201	4822 276 20508	Push Switch, Mute

REF. DESIG.	PART NO.	DESCRIPTION
		P401-PHONO AMP/ INPUT REC SEL. CIRCUIT BOARD
		P401-CAPACITORS
C401	4822 121 42712	Film 100pF ±5% [/20B/21B/21G]
	4822 121 42708	Film 330pF ±5% [/22B/22G]
C402	4822 121 42712	Film 100pF ±5% [/20B/21B/21G]
	4822 121 42708	Film 330pF ±5% [/22B/22G]
C403	4822 121 42861	Film 1000pF ±5%
C404	4822 121 42861	Film 1000pF ±5%
C405	4822 124 41535	Elect 100μF 25V
C406	4822 124 41535	Elect 100μF 25V
C407	4822 121 43133	Film 0.039μF ±5%
C408	4822 121 43133	Film 0.039μF ±5%
C409	4822 121 42754	Film 0.01μF ±5%
C410	4822 121 42754	Film 0.01μF ±5%
C411	4822 121 42861	Film 1000pF ±5%
C412	4822 121 42861	Film 1000pF ±5%
C413	4822 121 43134	Film 4700pF ±5%
C414	4822 121 43134	Film 4700pF ±5%
C415	4822 124 22571	Elect 10μF 50V
C416	4822 124 22571	Elect 10μF 50V
C417	4822 121 42762	Film 3300pF ±5%
C418	4822 121 42762	Film 3300pF ±5%
C419	4822 124 23649	Elect 470μF 25V
C420	4822 124 23649	Elect 470μF 25V
C421 ~ C436	4822 122 32486	Ceramic 0.01μF +80% -20%
C447	4822 121 42712	Film 100pF ±5% [/22B/22G]
C448	4822 121 42712	Film 100pF ±5% [/22B/22G]
		P201-CAPACITORS (COMMON)
C***		High Dielectric Constant Ceramic Capacitor: C437~C446, C449~C452 [/22B/22G]
		P401-RESISTORS
R425	4822 052 10479	47 Ω ±5% 1/4W
R426	4822 052 10479	47 Ω ±5% 1/4W
		P401-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R401~R424, R427~R440
		P401-SEMICONDUCTORS
D401 ~ D404	4822 130 33305	Diode 1SS176, etc.
Q401	4822 209 73064	IC NJM2068DD
		P401-MISCELLANEOUS
J401	4822 290 81598	Terminal, 2P RCA Jack
J402	4822 290 81598	Terminal, 2P RCA Jack
J403	4822 290 81603	Terminal, 4P RCA Jack [/20B/21B/22B]
	4822 290 81599	Terminal, 4P RCA Jack [21G/22G]
J404	4822 290 81603	Terminal, 4P RCA Jack [/20B/21B/22B]
	4822 290 81599	Terminal, 4P RCA Jack [21G/22G]
J405	4822 290 81603	Terminal, 4P RCA Jack [/20B/21B/22B]
	4822 290 81599	Terminal, 4P RCA Jack [21G/22G]
S401	4822 277 21116	Slide Switch, Input Selector
S402	4822 277 30823	Slide Switch, Rec Selector
S403	4822 276 13409	Push Switch, MM/ MC
L401	4822 156 11019	Choke Coil, 320mH [/22B/22G]
L402	4822 156 11019	Choke Coil, 320mH [/22B/22G]

REF. DESIG.	PART NO.	DESCRIPTION
		P501-VOLUME AMP CIRCUIT BOARD
		P501-CAPACITORS
C501	4822 121 42712	Film 100pF ±5%
C502	4822 121 42712	Film 100pF ±5%
C503	4822 123 30086	Mica 47pF ±5%
C504	4822 123 30086	Mica 47pF ±5%
C505	4822 121 43022	Film 0.1μF ±5%
C506	4822 121 43022	Film 0.1μF ±5%
C507	4822 123 30089	Mica 22pF ±5%
C508	4822 123 30089	Mica 22pF ±5%
C509	4822 124 22571	Elect 10μF 50V
C510	4822 124 22571	Elect 10μF 50V
C511	4822 124 80552	Elect 330μF 16V
C512	4822 124 80552	Elect 330μF 16V
		P501-RESISTORS
R509 ~ R514	4822 050 23308	3.3MΩ ±5% 1/6W
R519 ~ R522	4822 050 10109	10Ω ±5% 1/6W
R525	4822 050 21021	100Ω ±5% 1/4W
R526	4822 050 21021	100Ω ±5% 1/4W
R529	4822 100 12014	250KΩ x 2 + 2KΩ x 2 Variable
		P501-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R501~R508, R515~R518, R523, R524, R527, R528
		P501-SEMICONDUCTORS
D501 ~ D504	4822 130 33305	Diode 1SS176, etc.
Q501	4822 130 43283	Transistor 2SC2705 (O/ Y)
Q502	4822 130 43283	Transistor 2SC2705 (O/ Y)
Q503	4822 130 42999	Transistor 2SA1145 (O/ Y)
Q504	4822 130 42999	Transistor 2SA1145 (O/ Y)
		P601-TONE AMP/ SPEAKER SW. CIRUIT BOARD
		P601-CAPACITORS
C601	4822 124 41543	Elect 1μF 50V
C602	4822 124 41543	Elect 1μF 50V
C603 ~ C606	4822 121 43022	Film 0.1μF ±5%
C607	4822 121 42712	Film 100pF ±5%
C608	4822 121 42712	Film 100pF ±5%
C609	4822 124 22571	Elect 10μF 50V
C610	4822 124 22571	Elect 10μF 50V
C613	4822 121 42712	Film 100pF ±5%
C614	4822 121 42712	Film 100pF ±5%
C615	4822 124 22571	Elect 10μF 50V
C616	4822 124 22571	Elect 10μF 50V
C617	4822 124 22696	Elect 3.3μF 50V
C618	4822 124 22696	Elect 3.3μF 50V
C619	4822 121 43006	Film 0.033μF ±5%
C620	4822 121 43006	Film 0.033μF ±5%
C621	4822 121 42754	Film 0.01μF ±5%
C622	4822 121 42754	Film 0.01μF ±5%
C623	4822 121 42712	Film 100pF ±5%
C624	4822 121 42712	Film 100pF ±5%
C625 ~ C628	4822 124 90365	Elect 220μF 25V
C629	4822 122 32486	Ceramic 0.01μF +80% -20%
C630	4822 122 32486	Ceramic 0.01μF +80% -20%
C631	4822 122 32486	Ceramic 0.01μF +80% -20% [/22B/22G]
C632	4822 122 32486	Ceramic 0.01μF +80% -20% [/22B/22G]
		P601-RESISTORS
R625	4822 100 11972	10KΩ (B) x 2 Variable
R626	4822 100 11972	10KΩ (B) x 2 Variable
R627	4822 050 24701	470Ω ±5% 1/4W
R628	4822 050 24701	470Ω ±5% 1/4W
R629	4822 116 83929	220Ω ±5% 1/4W
R630	4822 116 83929	220Ω ±5% 1/4W
R631	4822 052 10109	10Ω ±5% 1/6W
R632	4822 052 10109	10Ω ±5% 1/6W
		P601-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R601~R624
		P601-SEMICONDUCTORS
Q601 ~ Q604	4822 209 73064	IC NJM2068DD
		P601-MISCELLANEOUS
J606	4822 267 31126	Jack, Headphone [/20B/21B/22B]
	4822 267 31119	Jack, Headphone [/21G/22G]
S601	4822 276 30416	Push Switch, Direct/ Subsonic/ Mono
S602	4822 276 30415	Push Switch, Speaker
		P651-BALANCE VOLUME CIRCUIT BOARD
		P651-RESISTOR
R651	4822 101 30652	100KΩ x 2 Variable
		P651-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R652, R653
		P701-POWER AMP/ SPK PROTECTOR CIRCUIT BOARD
		P701-CAPACITORS
C701	4822 121 42712	Film 100pF ±5%
C702	4822 121 42712	Film 100pF ±5%
C703	4822 121 42823	Film 2200pF ±5%
C704	4822 121 42823	Film 2200pF ±5%
C705	4822 121 43381	Film 470pF ±5%
C706	4822 121 43381	Film 470pF ±5%
C707	4822 123 30093	Mica 5pF ±5pF
C708	4822 123 30093	Mica 5pF ±5pF
C709	4822 124 90362	Elect 22μF 50V
C710	4822 124 90362	Elect 22μF 50V
C711	4822 124 41535	Elect 100μF 50V
C712	4822 124 41535	Elect 100μF 50V
C713	4822 124 22571	Elect 10μF 50V
C714	4822 124 22571	Elect 10μF 50V
C715	4822 124 23068	Elect 220μF 63V
C716	4822 124 23068	Elect 220μF 63V
C717	4822 121 43022	Film 0.1μF ±5%
C718	4822 121 43022	Film 0.1μF ±5%
C719	4822 124 80553	Elect 330μF 50V
C720	4822 124 80553	Elect 330μF 50V
CN01 ~ CN04	4822 121 43136	Film 0.068μF ±5%
CN05	4822 124 22273	Elect 0.47μF 50V
CN06	4822 124 22698	Elect 47μF 25V
CN07	4822 121 42754	Film 0.01μF ±5%
CN09	4822 124 22698	Elect 47μF 25V
CN10	4822 124 22273	Elect 0.47μF 50V

REF. DESIG.	PART NO.	DESCRIPTION
CN12 ~ CN15	4822 122 32486	Ceramic 0.01μF +80% -20% [/22B/22G]
		P701-CAPACITORS (COMMON)
C***		Plastic Film Capacitor, ±5% 50V: CN08, CN11
		P701-RESISTORS
R705	4822 052 10109	10 Ω ±5% 1/6W
R706	4822 052 10109	10 Ω ±5% 1/6W
R745	4822 116 80252	13K Ω ±1% 1/6W
R746	4822 116 80252	13K Ω ±1% 1/6W
R751	4822 100 20681	2.2K Ω Trimming
R752	4822 100 20681	2.2K Ω Trimming
R753	4822 100 11372	47K Ω Trimming
R754	4822 100 11372	47K Ω Trimming
R755 ~ R758	4822 052 10101	100 Ω ±5% 1/6W
R759 ~ R762	4822 050 22262	2.2K Ω ±5% 1/4W
R763 ~ R766	4822 050 26801	680 Ω ±5% 1/4W
R767 ~ R770	4822 052 10479	47 Ω ±5% 1/6W
R771	4822 053 10151	150 Ω ±5% 1W
R772	4822 053 10151	150 Ω ±5% 1W
R773 ~ R780	4822 052 10109	10 Ω ±5% 1/6W
R781 ~ R784	4822 116 82049	0.18 Ω x 2, 3W
R785 ~ R788	4822 050 21022	1K Ω ±5% 1/4W
R789	4822 053 10102	1K Ω ±5% 1W
R790	4822 053 10102	1K Ω ±5% 1W
R791	4822 052 10479	47 Ω ±5% 1/4W
R792	4822 052 10479	47 Ω ±5% 1/4W
RN09	4822 052 10109	10 Ω ±5% 1/4W [/20B/21B/21G]
	4822 116 83929	220 Ω ±5% 1/4W [/22B/22G]
RN10	4822 052 10109	10 Ω ±5% 1/4W [/20B/21B/21G]
	4822 116 83929	220 Ω ±5% 1/4W [/22B/22G]
RN11	4822 053 10109	10 Ω ±5% 1W
RN12	4822 053 10109	10 Ω ±5% 1W
RN13	4822 053 10331	330 Ω ±5% 1W
RN14	4822 053 10331	330 Ω ±5% 1W
		P701-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: RN01~RN08, RN15~RN26, R701~R704, R707~R716, R721~R744, R747~R750
		P701-SEMICONDUCTORS
D701 ~ D714	4822 130 33305	Diode 1SS176, etc.
D715 ~ D718	4822 130 80326	L. E. D. LT3D8B (RED)
D719 ~ D722	4822 130 83395	Zener RD20F-B3
D723 ~ D726	4822 130 33305	Diode 1SS176, etc.

REF. DESIG.	PART NO.	DESCRIPTION
D727 ~ D730	4822 130 33948	Zener RD5.6JB2/ MTZJ5.6B
D731 ~ D734	4822 130 80837	Diode HSS81TD
DN01	4822 130 80837	Diode HSS81TD
DN02	4822 130 80837	Diode HSS81TD
DN03 ~ DN06	4822 130 33305	Diode 1SS176, etc.
Q701	4822 130 63309	Transistor 2SC3067 (G, H)
Q702	4822 130 63309	Transistor 2SC3067 (G, H)
Q703	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q704	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q705 ~ Q708	4822 130 42951	Transistor 2SA970 (GR, BL)
Q709	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q710	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q711	4822 130 42951	Transistor 2SA970 (GR, BL)
Q712	4822 130 42951	Transistor 2SA970 (GR, BL)
Q713	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q714	4822 130 43233	Transistor 2SC2240 (GR, BL)
Q715	4822 130 63308	Transistor 2SA1859 (O, Y)
Q716	4822 130 63308	Transistor 2SA1859 (O, Y)
Q717	4822 130 63312	Transistor 2SC4883 (O, Y)
Q718	4822 130 63312	Transistor 2SC4883 (O, Y)
Q719	4822 130 60526	Transistor 2SD1508
Q720	4822 130 60526	Transistor 2SD1508
Q721	4822 130 90347	Photo Unit PC-817
Q722	4822 130 90347	Photo Unit PC-817
Q723	4822 130 43283	Transistor 2SC2705 (O, Y)
Q724	4822 130 43283	Transistor 2SC2705 (O, Y)
Q725	4822 130 42999	Transistor 2SA1145 (O, Y)
Q726	4822 130 42999	Transistor 2SA1145 (O, Y)
Q727	4822 130 63312	Transistor 2SC4883 (O)
Q728	4822 130 63312	Transistor 2SC4883 (O)
Q729	4822 130 63308	Transistor 2SA1859 (O)
Q730	4822 130 63308	Transistor 2SA1859 (O)
Q731		Transistor 2SC4467 (P, Y)
Q732		Transistor 2SC4467 (P, Y)
Q733		Transistor 2SA1694 (P, Y)
Q734		Transistor 2SA1694 (P, Y)
Q735		Transistor 2SC4467 (P, Y)
Q736		Transistor 2SC4467 (P, Y)
Q737		Transistor 2SA1694 (P, Y)
Q738		Transistor 2SA1694 (P, Y)
QN01	4822 130 43233	Transistor 2SC2240 (GR, BL)
QN02	4822 130 43233	Transistor 2SC2240 (GR, BL)
QN03	4822 130 42951	Transistor 2SA970 (GR, BL)
QN04	4822 209 83312	IC TA7317P
QN05	4822 130 42594	Transistor, Digital DTC144ES
QN06	4822 130 60107	Transistor 2SA1048 (Y, GR)
QN07	4822 130 61439	Transistor 2SB1237 (R)
		P701-MISCELLANEOUS
JN01	4822 290 60837	Terminal, SPK [/00B/01B/02B]
	4822 290 61162	Terminal, SPK [/01G/02G]
JN02	4822 290 60836	Terminal, SPK [/00B/01B/02B]
	4822 290 61161	Terminal, SPK [/01G/02G]
LN01	4822 157 70592	Air Coil, SPK
LN02	4822 157 70592	Air Coil, SPK
LN03	4822 280 70354	Relay, 24MBU-510
LN04	4822 280 70354	Relay, 24MBU-510
LN05	4822 280 20501	Relay, MR62-24SR
		P801-POWER AMP/ POWER SUPPLY CIRCUIT BOARD
C801	4822 124 80551	Elect Cap. 15000μF 63V x 2
C802	4822 122 40545	Ceramic Cap. 0.01μF +80% -20% [/22B/22G]
C803	4822 122 40545	Ceramic Cap. 0.01μF +80% -20% [/22B/22G]

REF. DESIG.	PART NO.	DESCRIPTION
▲G801	4822 121 20263	Cap. Comp. 0.47μF + 6.8 Ω
▲D801	4822 130 33132	Diode D5FB20
▲D802	4822 130 32508	Diode RL103E/ DSF10C
▲L801	4822 280 20403	Relay MC24D2-0
		P851-POWER SUPPLY CIRCUIT BOARD
		P851-CAPACITORS
C851	4822 124 22695	Elect 2200μF 35V
C852	4822 124 22695	Elect 2200μF 35V
C853	4822 124 41535	Elect 100μF 25V
C854	4822 124 41535	Elect 100μF 25V
C855	4822 124 23649	Elect 470μF 25V
C856	4822 124 23649	Elect 470μF 25V
C857	4822 124 80554	Elect 330μF 63V
C858	4822 124 80554	Elect 330μF 63V
C859	4822 124 90356	Elect 1000μF 35V
C860	4822 124 22571	Elect 10μF 50V
C861	4822 124 90354	Elect 100μF 16V
C862	4822 124 41543	Elect 1μF 50V
C863	4822 122 32486	Ceramic 0.01μF +80% -20%
C864	4822 122 32486	Ceramic 0.01μF +80% -20%
▲G851	4822 121 20263	Comp. 0.47μF + 6.8 Ω
		P851-RESISTORS
R851	4822 117 10158	1 Ω ±5% 1/4W
R852	4822 117 10158	1 Ω ±5% 1/4W
R857	4822 117 10158	1 Ω ±5% 1/4W
R862		
R863	4822 052 10331	330 Ω ±5% 1/4W
R864	4822 052 10331	330 Ω ±5% 1/4W
R865	4822 052 10479	47 Ω ±5% 1/4W
R866	4822 052 10479	47 Ω ±5% 1/4W
		P851-RESISTORS (COMMON)
R***		Carbon Film Fixed Resistor, ±5% 1/6W: R853~R856, R867~R871
		P851-SEMICONDUCTORS
▲D851 ~ ▲D858	4822 130 80839	Diode S5688G
D859 ~ D862	4822 130 33305	Diode 1SS176, etc.
D863	4822 130 82474	Zener RD20JB2/ MTZJ20C
D864	4822 130 82474	Zener RD20JB2/ MTZJ20C
▲D865 ~ ▲D876	4822 130 80839	Diode S5688G
D877	4822 130 80272	Zener RD7.5JB2/ MTZJ7.5C
D878	4822 130 80272	Zener RD7.5JB2/ MTZJ7.5C
D879	4822 130 80839	Diode S5688G
D880	4822 130 80839	Diode S5688G
D881	4822 130 33305	Diode 1SS176, etc.
Q851	4822 130 42951	Transistor 2SA970 (GR, BL)
Q852	4822 130 43233	Transistor 2SC2240 (GR, BL)
▲Q853	4822 130 63292	Transistor 2SD1417
▲Q854	4822 130 63291	Transistor 2SB1022
Q855	4822 209 30441	IC NJM7824FA
Q856	4822 130 42951	Transistor 2SA970 (GR, BL)
Q857	4822 130 43233	Transistor 2SC2240 (GR, BL)

REF. DESIG.	PART NO.	DESCRIPTION
		P901-FUSE/ TRANSFORMER CIRCUIT BOARD
C901	4822 122 40545	Ceramic Cap. 0.01μF +80% -20% [/22B/22G]
C902	4822 122 40545	Ceramic Cap. 0.01μF +80% -20% [/22B/22G]
▲F901	4822 070 33152	Fuse 3.15A 250V [/20B/22B/22G]
▲F902	4822 253 30387	Fuse 4A 250V
▲F903	4822 253 30387	Fuse 4A 250V
▲L001	4822 146 21734	Power Transformer [/20B/22B/22G]
	4822 146 21735	Power Transformer [/21B/21G]
		P951-POWER SWITCH CIRCUIT BOARD
▲C951	4822 121 43732	Film Cap. 0.01μF ±20%
▲S951	4822 276 12647	Push Switch, Power

NOTE ON SAFETY :
Symbol ▲ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ▲. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.